

### **Remarks**

Claims 15 - 19, 30 - 36 are pending. Favorable reconsideration is respectfully requested.

Claims 17 - 19 have been rejected under 35 U.S.C. § 112 ¶1 for lack of written description and lack of enablement for the use of the formula



This formula is incorrect due to a clerical error, for which Applicants' attorney apologizes. The formula has been corrected to read



The definition of  $R^1$  has also been changed, taken from the  $R^1$  radicals listed on page 5 to 6 of the application, to limit the  $R^1$  groups to alkyl, alkenyl, aryl, and alkylaryl radicals. The claim is fully supported by the specification as filed, both with respect to written description and enablement.

Claim 18 had been rejected under 35 U.S.C. § 112 ¶1 as not having support in the specification. Reference may be had to page 5, line 20 which provides support for this claim, where use of mixtures of silane (I) and organosiloxane (II) is disclosed. The claim has been amended to recite that such mixtures may be used. Withdrawal of the rejections under 35 U.S.C. § 112 is respectfully solicited. New claims 32 and 33 have been added to claim preferred embodiments, as set forth on page 6, lines 12 - 14 and page 7, lines 8 - 9.

The subject invention is directed to partly water wettable modified silicas, characterized by a contact angle  $\theta$  of less than  $180^\circ$ , preferably between  $100^\circ$  and  $0^\circ$  and more preferably between  $90^\circ$  and  $0^\circ$  as indicated on page 12 of the specification and reflected in new

claims 24 and 35, and a density of surface silanol groups between 0.9 and 1.7 preferably between 1.2 and 1.7 as indicated on page 12 of the specification and reflected in new claim 36.

Thus, these particles are hydrophobically modified but only such that a considerable proportion of surface silanol groups remain, such that the particles are also at least partly water wettable. Wettability is generally characterized by the methanol number. This number corresponds to the percentage of methanol which must be added to water to cause all of the particles to be wetted, *i.e.* to sink rather than float on the surface. The claims require the methanol number to be less than 30, *i.e.* all the particles will be wetted by a solution of less than 30% methanol in water.

Claims 15, 16, 30, and 31 have been rejected over Barthel U.S. Patent 5,686,054 ("*Barthel*"). Dr. Barthel is a coinventor of the claimed invention.

*Barthel* is directed to producing highly hydrophobic silica with no residual silanol groups. *See, e.g. Barthel* at column 1, lines 44 - 48:

One object of the present invention is the effective elimination of the silanol groups on the silica surface, that is, the complete silylation of the silica, since these silanol groups in polar systems, destabilize the three-dimensional particle network which is necessary for thickening and thixotropy.

No silanol groups can be detected in the products of *Barthel*. Note column 8, lines 57 - 64:

The highly apolar silica according to the invention has, per 100 m<sup>2</sup>/g specific surface area (measured by the BET method in accordance with DIN 66131 and 66132), a carbon content of at least 1% by weight, preferably at least 1.5% by weight and more preferably at least 2.0% by weight. No isolated silanol groups can be detected at a wave number of 3750 cm<sup>-1</sup> on the silica by means of IR spectroscopy.

Furthermore, even with prolonged contact with water, as indicated in column 8, lines 64 - 66, the silica has no water wettable fractions:

Even after prolonged intense contact with water, for example shaking, the silica has no water-wettable fractions. The silica exhibits a methanol number (Appendix III) of greater than or equal to 50, preferably greater than 65 and more preferably greater than 75.

In contrast, the subject invention silicas are at least partly wettable by water, as explained on page 12, lines 15 - 19 of the specification.

Finally, the methanol number of the *Barthel* silica is greater than 50, and preferably greater than 65, more preferably greater than 75, as disclosed by *Barthel* at column 8, line 66 to column 9, line 2.

The silica exhibits a methanol number (Appendix III) of greater than or equal to 50, preferably greater than 65 and more preferably greater than 75.

Thus, the silicas disclosed by *Barthel* are completely different from those claimed, both in water wettability, surface silanol content, and methanol number.

*Barthel* teaches production of only highly hydrophobic, apolar silica. Thus, *Barthel* teaches away from the claimed compositions, which include hydrophobicized but water wettable silica. Teaching away is strong evidence of non-obviousness. *W.L. Gore v. Garlock*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

On page 5 of the Office Action, the Office indicates that "overlapping ranges are *prima facie* evidence of obviousness." This is true as far as it goes, but the overlapping range must relate to the claimed invention. It is well established that the amounts of starting

ingredients for hydrophobicizing silica can vary over wide ranges. This variation is due in part, as is known to the skilled artisan, to differences in hydrophobicity of the modifying groups; difference in molecular weights of the modifying compounds; differences in starting silica silanol content; difference in particle size, roughly inversely proportional to surface area; degree of reaction of the hydrophobing compound with silica, and degree of removal of unreacted hydrophobing agent post reaction.

The Examiner recites that it is her position that the silica of *Barthel* would have the claimed properties. However, this is clearly incorrect, as *Barthel* himself indicates that it is not the case. *Barthel's* products all have no residual silanol groups, are completely non-wettable, and have methanol numbers above 50, preferably higher. In contrast, Applicants' claimed silicas have from 0.9 to 1.7 SiOH/nm<sup>2</sup> and a methanol number of less than 30, and are water wettable. These are completely and non-obviously different. The Examiner's surmise appears to be based on principles of inherency. However, inherency is immaterial to obviousness. *See, e.g. In re Shetty*, 195 USPQ 753, 757 (CCPA 1977); *In re Naylor*, 152 USPQ 106, 108 (CCPA 1966); *In re Spormann*, 150 USPQ 449, 452 (CCPA 1964). It is quite possible, for example, to start with the same starting silica, the same amount of hydrophobing agent, and yet produce two entirely different products. One way to do this, for example, is to react at different temperatures and/or different times, or with a different mode of addition. Thus, there is no scientific support for the Office's conclusion.<sup>1</sup> Moreover, a rejection must be based on facts, not conclusions. *See, e.g. In re Soli*, 137 USPQ 797 (CCPA 1963).

The Examiner states that it would be obvious "to have selected the portion of *Barthel et al.'s* range that corresponds to the claimed range." However, this is incorrect for at least three reasons. First, the amount of hydrophobing agent is not a claim limitation. Second, the carbon content of the claimed silica, which is a claim limitation, is not the sole limitation, but is only one of five limitations; each limitation must be satisfied. Third, the idea of producing hydrophobicized but water wettable silica was not that of *Barthel*, but of Applicants. *Barthel*

---

<sup>1</sup>See also the discussion on pages 10 - 11 herein.

does not disclose, teach or suggest doing so. Rather, the entire *Barthel* application is directed to doing just the opposite: producing highly hydrophobic, apolar silica with no residual silanol content, and with a high methanol number, which is completely non-wettable. There is no motivation to modify *Barthel* to produce Applicants' silica. *Barthel* teaches not to do so. Withdrawal of the rejection of the claims over *Barthel* is respectfully solicited for these reasons.

Separately with regard to claim 16, the Office characterizes this claim as merely limiting an optional ingredient. This is not so, as clearly indicated by the claim language, which recites that silylating is performed with organopolysiloxane(s) II. This is not optional.

Claims 15, 16, 30, and 31 have been rejected over Tojo U.S. 5,278,204 ("*Tojo*"). Applicants respectfully traverse this rejection.

As *Tojo* indicates at column 5, first full paragraph, when dry method silica such as fumed silica is used in his process, all the surface silanol groups are blocked. Thus, the silicas of *Tojo* cannot have a surface silanol content of 0.9 to 1.7 SiOH/nm<sup>2</sup> as required by the claim. Claim 15 requires that the starting silica is dry process silica.

*Tojo* also does not disclose the contact angle nor the methanol number of his silicas, and as explained earlier, the amount of silylating agent does not determine these values, since the silylating agents themselves may vary, the starting silanol content may vary, the degree of reaction may vary, and the surface area of the silica may vary. Thus, whether or not *Tojo* employs the same amount of silylating reagents or not, or has the same carbon content, are both irrelevant to contact angle, surface silanol content, or methanol number. That this is so is so well known to the skilled artisan that judicial notice is taken thereof. Support may also be found by the Examples previously submitted. In the first two of these examples, the same amount of silylating agent is used, 4.29 weight percent, and the silica carbon content of the product is very close. Yet, one product is water wettable with a methanol number of 0 (all the silica particles are wetted by pure water), while the comparative product requires 45 weight percent methanol to be wettable. In a yet third example, the amount of silylating agent was doubled, yet the % carbon

in the product was less. This product was also non-water wettable. These results are presented below in tabular form.

Table

Example	Starting Silica	Silylating Agent	Silylating Agent Amount (%)	% C in product	Water Wettability	Methanol Number
1	HDK N20	Me <sub>2</sub> SiCl <sub>2</sub>	4.29	0.82	Yes	0
2(comp.)	HDK N10	Me <sub>2</sub> SiCl <sub>2</sub>	4.29	0.85	No	45
3(comp.)	HDK N20	MeSiCl <sub>3</sub>	9.90	0.81	No	40

To render a claim obvious, the reference must teach or suggest what Applicants have done. *Tojo* does not disclose, nor does he teach or suggest any silica having a contact angle less than 180°, a coverage  $\tau$  of  $>1$  to  $<50\%$ , a density of surface silanol groups of 0.9 to 1.7 SiOH/nm<sup>2</sup>, or a methanol number  $<30$ .

The rejection, as is the case with *Barthel*, appears to be based on principles of inherency, which do not apply to rejections under 35 U.S.C. § 103(a). Moreover, even the basis for the Office's conclusions is flawed, as the amounts of reagents used and the carbon content of the product are not related to the claimed limitations of  $\theta$ ,  $\tau$ , surface silanol content, or methanol number. Withdrawal of the rejection of the claims over *Tojo* is solicited.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, the Examiner is highly encouraged to telephone Applicants' attorney at the number given below.



S/N: 10/738,543  
Reply to Office Action of July 2, 2008

Atty Dkt No. WAS 0611 PUS

Please charge any fees or credit any overpayments as a result of the filing of this paper to our Deposit Account No. 02-3978.

Respectfully submitted,

**Torsten Gottschalk-Gaudig et al.**

By 

William G. Conger

Reg. No. 31,209

Attorney/Agent for Applicant

Date: October 1, 2008

**BROOKS KUSHMAN P.C.**  
1000 Town Center, 22nd Floor  
Southfield, MI 48075-1238  
Phone: 248-358-4400  
Fax: 248-358-3351